

# MRX

## RF Marker Locator

### Technical specification






# MRX Locator Specification

## 1. Product Summary

1.1 Product Descriptions	Multi-purpose Precision Locator Cable, Pipe and RF Marker Locator Locate System Receiver Multi-function Precision Locator
1.2 Intended Use	Locating the position / path of buried cables, pipes and RF Markers. Detecting and pinpointing insulation faults on buried pipes and cables
1.3 Standard Equipment	Locator with lithium-ion battery pack Charger and mains lead USB lead User guide

## 2. Performance

2.1 Sensitivity	6E-15 Tesla 5 $\mu$ A at 1 meter (33kHz)
2.2 Dynamic range	140dB rms/VHz
2.3 Selectivity	120dB/Hz
2.4 Depth measurement precision <sup>1</sup>	<p>Cable / Pipe / Sonde: <math>\pm 3\%</math>            RF Markers: <math>\pm 15\% \pm 5\text{cm}</math> – RF Marker Type dependent.            Depth precision valid to:</p> <div>  Near Surface: 2' / 60cm   Ball Marker: 4.9' / 1.5m   Mid-Range: 5.9' / 1.8m   Full Range: 7.9' / 2.4m         </div>
2.5 Locate accuracy	$\pm 5\%$ of depth
2.6 Active Locate filter bandwidth	$\pm 3\text{Hz}$ , $0 < 1\text{kHz}$ $\pm 10\text{Hz}$ , $\geq 1\text{kHz}$
2.7 Start-up time	< 2.5 second
2.8 Maximum depth readout <sup>2</sup>	Cable / Pipe: 98' / 30m Sonde: 64' / 19.5m RF Markers: 16' / 5m



### 3. Locate Functions

3.1 Active Locate Modes	<ul style="list-style-type: none"><li>• Peak</li><li>• Peak+™ (choice of combined Peak &amp; Guidance or Peak &amp; Null)</li><li>• Guidance</li><li>• RF Marker</li><li>• Combined (Cable, Pipe and RF Marker)</li></ul>				
3.2 Gain control	Guidance Mode: Automatic Other modes: Manual gain using “+” or “-” with one touch to return to center (50% of Full Scale)				
3.3 Active locate frequencies	8 Frequencies: 512Hz, 640Hz, 8kHz, 33kHz, 65kHz, 83kHz, 131kHz and 200kHz  *Use of the 200kHz frequency is subject to radio licensing for Short Range Devices in the EU and possibly other countries. Users are responsible for complying with local regulations.				
3.4 RF Markers	Utility		Display abbreviation	Color	Frequency
	French Power		PFR	Natural	40.0 kHz
	General / Non-drinkable water		PUR	Purple	66.35 kHz
	Cable TV		CTV	Black / Orange	77.0 kHz
	Gas		GAS	Yellow	83.0 kHz
	Telephone / Telecoms		TEL	Orange	101.4 kHz
	Sanitary		SAN	Green	121.6 kHz
	German Power		PDE	Blue / Red	134.0 kHz
	Water		H2O	Blue	145.7 kHz
	Electrical Power*		PWR	Red	169.8 kHz
	*Use of the red Electrical Power (PWR) marker locate mode is subject to radio licensing restrictions for Short Range Devices in the EU and possibly other countries. Use of the orange Telephone/Telecoms (TEL) marker locate mode is restricted in Canada. Users are responsible for complying with local regulations.				
3.5 Sonde Frequencies	4 Frequencies: 512Hz, 640Hz, 8kHz and 33kHz				
3.6 Fault Find	8KFF Locate insulation sheath faults on pipes and cables to 10cm / 4" accuracy using the accessory A-Frame and a compatible transmitter				
3.7 Passive Locate Modes	Power, Radio and CPS (Cathodic Protection System)				
3.8 Power Filters™ function	Switch out of Radiodetection's sensitive Power Mode to locate on any of 5 individual mains harmonic frequencies.				
	HARMONIC		50 Hz regions	60 Hz regions	
	Primary		50 Hz	60 Hz	
	3rd		150 Hz	180 Hz	
	5th		250 Hz	300 Hz	
	7th		350 Hz	420 Hz	
	9th		450 Hz	540 Hz	

3.9 Information displayed	<ul style="list-style-type: none"> <li>• Signal strength - moving bar graph and numeric value</li> <li>• Mode indication (Peak, Null, Guidance, Peak+ with option of Guidance arrows or Null arrows)</li> <li>• Line or Sonde locate type</li> <li>• Proportional left/right indication</li> <li>• Compass: full 360° line direction indicator</li> <li>• Accessories in use indication</li> <li>• Accessory specific custom screen</li> <li>• Simultaneous depth and current readout (Line location)</li> <li>• Depth readout (Sonde location)</li> <li>• Gain level (in dB)</li> <li>• Frequency selected</li> <li>• Marker type selected</li> <li>• Battery condition</li> <li>• Speaker volume</li> <li>• Operating frequency</li> <li>• Bluetooth® status</li> <li>• Configuration menu and submenus</li> <li>• Software version</li> <li>• Last calibration date</li> <li>• Fault Find mode indicator</li> <li>• Transmitter communication status</li> <li>• Transmitter standby status</li> <li>• StrikeAlert™ warning</li> <li>• Overload warning</li> <li>• Swing warning</li> </ul>
3.10 Audio output tones	<p><b>Volume level:</b> Vol0, Vol1, Vol2, Vol3, Vol4 and Vol5</p> <p><b>Audio Pitch:</b> Low and High</p> <p>Audio feedback for menu navigation</p> <p><b>StrikeAlert audio warning</b></p> <p><b>Swing audio warning</b></p> <p><b>Power / Radio modes:</b> Real Sound™ derived from detected electromagnetic signal</p> <p><b>Peak / Peak+ and CPS modes:</b> Synthesized audio tone proportional to signal strength</p> <p><b>Guidance mode:</b> Continuous tone when locator is to the left of target, intermittent tone when to the right of target</p>
3.11 Accessory locate functions	<p><b>Locator clamps:</b> Used to identify individual target cable(s) in a bundle or cabinet using signal strength read-out</p> <p><b>Stethoscopes:</b> Used to identify individual target cable(s) in a bundle or confined space such as a cabinet using signal strength read-out</p>

## 4. Locate Function Enhancements

4.1 StrikeAlert™	Audio and visual warning when a cable or pipe less than 12" / 30cm deep is detected. Operates in Active and Passive locating modes
4.2 Haptic Vibration	Handle vibrates when StrikeAlert, Swing and Overload warnings activated
4.3 Swing Warning	Audio and visual warning when the user is swinging the locator excessively
4.4 Dynamic Overload Protection™	40dB, automatic • Automatically manages the system gain to compensate for strong signals e.g. from mains power or substations, to enable accurate locating
4.5 Overload warning	If the MRX becomes overloaded, users will be alerted by a flashing mode icon. Both the depth and current measurements will be disabled in the event of an overload.
4.6 iLOC™	Metric: Remote transmitter control from up to 450m away <sup>3</sup> US Customary: Remote transmitter control from up to 1400' away <sup>3</sup> Control transmitter frequency, power level and SideStep
4.7 SideStep™	Enables locating where other signals are interfering, and without compromising the optimum locate frequency Remotely shifts the locate and transmitter frequency by several Hz, out of the bandwidth of other locate signals that may be interfering with the locate
4.8 Survey Measurements	Store up to 1,000 survey points within the locator, and append GPS data from external GNSS sources over Bluetooth Export data immediately or as a batch over Bluetooth
4.9 Simultaneous depth and current readout	Both utility depth and locate signal current are displayed simultaneously, giving the operator more information to help them to follow the target utility
4.10 Fault Find	Apply a Fault Find signal with a Tx-5 and Tx-10 transmitter, then use an accessory A-Frame to detect and pinpoint insulation faults Fault find accuracy: Metric: 10cm US Customary: 4"
4.11 Peak+ mode	Use the accurate Peak bargraph, and add either proportional Guidance arrows for faster locating, or Null arrows to check for the presence of distortion

## 5. Configurability

5.1 Phone operating system	Android iOS
5.2 Option selection	All options can be enabled or disabled on the locator or using the RD Manager Online PC software
5.3 Languages supported	Fourteen: English, French, German, Dutch, Polish, Czech, Slovakian, Spanish, Portuguese, Swedish, Italian, Turkish, Russian, Hungarian
5.4 Mains power network options	50 Hz or 60 Hz
5.5 Mode selection	All locate modes can be individually enabled or disabled
5.6 Active RF Marker selection	All RF Markers can be individually enabled or disabled
5.7 Active frequency selection	All active frequencies available can be individually enabled or disabled
5.8 Passive mode selection	All passive modes can be individually enabled or disabled
5.9 StrikeAlert	Enable / disable
5.10 Swing warning	Enable / disable
5.11 Haptic vibration	Enable / disable
5.12 Peak+ arrow selection	Guidance arrows or Null arrows Selected using the locator menu or with a long press of the antenna key
5.13 iLoc Connectivity	On/Off
5.14 Data export protocols supported	PPP/choice of 3 ASCII formats
5.15 Time/date setting	Correct or update locator real-time clock using the RD Manager Online PC software
5.16 Audio	Set audio tone frequency level high or low

## 6. Connectivity

6.1 Wired connections	<b>Type C USB (cable included as standard):</b> Connect to a PC to configure and update locator, and to retrieve Survey Measurements data <b>3.5mm Stereo jack:</b> Connect wired headphones <b>Accessory port:</b> Connect Radiodetection accessories
6.2 Wireless connections	2 x Bluetooth 2.0 – SPP profile, class 1 1 x Bluetooth Low Energy 5.0
6.3 iLoc remote transmitter control range <sup>3</sup>	Metric: Up to 450m US Customary: Up to 1400'
6.4 iLoc remote transmitter control functions	Set transmitter frequency Set transmitter power output level Transmitter standby SideStep

## 7. Data capabilities

7.1 Survey measurement capacity	Up to 1,000 data records	
7.2 Link to external GNSS ('GPS')	Over Bluetooth Connect to an external GNSS enabled device to combine survey measurements with that device's GNSS data on the external device	
7.3 External GNSS position read-in to locator memory	Connect to an external GNSS device to read positional positioning from that device and combine with the locator's survey measurement data on board the locator <sup>4</sup>	
7.4 Survey measurement data captured	<b>Standard data:</b> Log # Survey Reference Antenna Mode Depth Current (mA) Frequency in use (Hz) Sonde/Line Signal Strength (dBµV and %) Signal Strength (%) Gain Setting (dB) Compass (deg) Arrow readout CD Phase (deg) Accessory Type Battery level Volume Overload Flag Date and Time Marker Type Marker Depth Marker Gain (dB) Marker Signal Strength (%)	<b>With External GNSS Fix:</b> GPS Mode GPS Date and Time GPS Distance (m) Latitude Angle (deg) Latitude Direction Longitude Angle (deg) Longitude Direction GPS Fix Satellites in use Horizontal Dilution Altitude Value (m) Altitude Units Geoid Value (m) and Units DGPS Time Time Reference GPS Mode GPS Date and Time GPS Distance (m) Latitude Angle (deg)
7.5 Survey measurement export options	RD Manager Online via USB Bluetooth – 'live' per measurement Bluetooth – batch export	
7.6 Bluetooth survey measurement data protocol options	PPP ASCII (choice of 3 formats)	

## 8. Power options

8.1 Rechargeable	Custom Lithium-Ion (Li-Ion) battery pack
8.2 Battery run-time	Li-Ion pack: 15 hours (50% duty cycle)* *Based on highest power marker, all features on. Battery run time will vary based on use of power marker, Bluetooth, backlight strength and other features.
8.3 Charging options (Li-Ion pack)	Mains charger: 100-250 Volts AC, 50/60 Hz Automotive charger: 12-24V DC
8.4 Charging time (Li-Ion pack)	3 hours to 80% from empty with maintenance trickle charging thereafter
8.5 Charging temperature	Metric: 0°C to 45°C US Customary: 32°F to 113°F

## 9. Physical Characteristics

9.1 Design	Ergonomic, balanced and lightweight design for comfortable use during extended surveys
9.2 Construction	Injection Molded ABS Plastic
9.3 Weight	<b>With Lithium-Ion battery pack fitted:</b> Metric: 2.0kg US Customary: 4.41lb
9.4 Ingress Protection rating	IP65* Protected against dust ingress and jets of water <sup>4</sup> applied from any direction *The antenna loop is IP55 rated. Minimal dust ingress can occur, this does not affect performance
9.5 Display type	High contrast custom made monochrome LCD
9.6 Audio options	Built-in waterproofed speaker 3.5mm headphone socket
9.7 Operating temperature <sup>5</sup>	Metric: -10°C to 50°C US Customary: 14°F to 122°F
9.8 Storage temperature	Metric: -20°C to 50°C US Customary: -4°F to 122°F
9.9 Unit dimensions	Metric: 648mm × 350mm × 177mm US Customary: 25.5" × 13.8" × 6.9"
9.10 Shipping dimensions	Metric: 700mm × 260mm × 330mm US Customary: 27.6" × 10.9" × 15.6"
9.11 Shipping weight (kit)	Includes: <ul style="list-style-type: none"> <li>• MRX with lithium-ion battery</li> <li>• Mains charger + lead</li> <li>• MRX Bag</li> <li>• User guide</li> <li>• MRX box</li> </ul> Metric: 2.6kg US Customary: 5.7lb

## 10. RD Manager Online Supporting PC Software

10.1 Operating System Compatibility	Microsoft® Windows® 10 onwards – 64-bit versions
10.2 Locator system compatibility	Radiodetection RD7200, RD8200, RD8200SG, MRX, MRX G and MRX SG Precision Locators
10.3 Functions	<ul style="list-style-type: none"> <li>• Locator configuration</li> <li>• eCert® remote calibration certification</li> <li>• Factory calibration certificate retrieval</li> <li>• Usage-logging data collation and export</li> <li>• User account management</li> <li>• Locator software update</li> <li>• Survey Measurement retrieval</li> <li>• Product registration for extended warranty</li> </ul>
10.4 Data export formats	.csv for database and spreadsheet applications .xls / .xlsx for Microsoft® Excel®

## 11. Warranty and Maintenance

11.1 Manufacturer's warranty duration	3 years standard, on registration
11.2 Recommended calibration and maintenance schedule	Annual, or at the beginning / end of a lease period if earlier
11.3 eCert remote calibration	<ul style="list-style-type: none"> <li>• Remote calibration certification using an internet connection to Radiodetection</li> <li>• Recommended schedule: annual, or at the beginning / end of a lease period</li> </ul>
11.4 CALSafe®	<ul style="list-style-type: none"> <li>• Can be enabled to prevent the locator operating when beyond a defined calibration / maintenance schedule</li> <li>• Disabled by default</li> <li>• 30-day countdown to calibration due date</li> </ul>
11.5 Enhanced Self-Test	On-unit Applies test signals to locate circuitry to confirm correct operation, as well as the typical tests for screen and DSP functions. Recommended schedule: weekly, or before each use.
11.6 Storage recommendation	Store in a clean and dry environment. Ensure all terminals and connection sockets are clean, free of debris and corrosion and are undamaged
11.7 Cleaning	Clean with a soft, moistened cloth. Do not use <ul style="list-style-type: none"> <li>• Abrasive materials or chemicals</li> <li>• High pressure jets of water</li> </ul> If using this equipment in foul water systems or other areas where biological hazards may be present, use an appropriate disinfectant.

## 12. Certification and Compliance

12.1 Standards	
<i>CE Safety:</i>	EN 61010-1:2010 / A1:2019
<i>CE EMC:</i>	EN 61326-1:2021
<i>CE Radio:</i>	EN 301 489-3 V2.3.2 EN 301 489-17 V3.2.4 EN 300 330 V2.1.1 EN 300 328 V2.2.2
<i>CE SAR:</i>	EN 50566 EN 62479 IEC 62209-1528:2020
<i>ENV (Environmental):</i>	EN 60529 1992 A2 2013 EN 60068-2-64:2008 Test Fh ESTI EN 300 019-2-2:1999 (per table 6) EN 60068-2-27:2009 (Test Ea) EN 300 019-2-2:1999 (per table 6)
12.2 European directives	Radio Equipment Directive – 2014/53/EU Low Voltage Directive – 2014/35/EU EMC Directive – 2014/30/EU RoHS Directive – 2011/65/EU Battery Regulation – (EU) 2023/1542 Declaration of conformity is available from <a href="http://www.radiodetection.com">www.radiodetection.com</a>
12.3 Radio FCC, IC	
<i>FCC EMC:</i>	47CFR 15.107 47CFR 15.109 ICES-003 Issue 7, January 2020
<i>FCC RF:</i>	47CFR 15.207 47CFR 15.209 RFC 15.247
<i>FCC SAR:</i>	FCC 47 CFR part 2 (2.1093)
<i>ISED SAR:</i>	RSS-102 Issue 5, March 2015
12.4 Environmental	WEEE compliant ROHS compliant Altitude: up to 5000m Outdoor use Wet location
12.5 Manufacturing	ISO 9001: 2015

All specification are measured in test conditions, at 21°C / 70°F.

<sup>1</sup> Based on volumetric testing at a known fixed depth. True depth accuracy depends on factors such as ground composition, utility characteristics and the locate frequency / signal strength employed. Always follow local safe digging guidelines.

<sup>2</sup> The MRX will locate to greater depths in the right conditions, but depth accuracy will be compromised. Depth measurement will not be displayed beyond these depths.

<sup>3</sup> Tested with clear line-of-sight. Range is dependent on electrical environment and weather conditions. For optimum range, face the locator toward the transmitter and raise the transmitter 2' / 60cm from the ground.

<sup>4</sup> Water projected by a nozzle at a pressure of 30kPa / 0.3 bar / 4.4 psi in accordance with BS EN 60529 1992 A2 2013.

<sup>5</sup> At very low temperatures, battery life will be degraded and measurement precision may reduce.

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